APPENDIX 7-1

BIRD SURVEY RESULTS – WINTER 2019-2019

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Bird Survey Report Winter 2018-19

BIRD SURVEY REPORT

WINTER 2018/19

Seven Hills Wind Farm Phase I and II

Prepared for: Seven Hills Wind Farm Ltd

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1.0 Introduction

SLR Consulting Ireland (SLR) was commissioned by Seven Hills Wind Farm Ltd. on 9 October 2018 to carry out a winter bird survey programme for the proposed Seven Hills Wind Farm, Co. Roscommon during the winter period 2018/19. There are two phases within the current iteration of the wind farm design, hereafter referred to as Wind Farm I and Wind Farm II.

1.1 Background to the Commission

Planning permission was originally granted by An Bord Pleanála (ABP) for both of these developments (Phase 1 ABP Planning Ref: PL 20.244346 / 20.239759; and Phase 2 ABP Planning Ref: PL 20.244347 / 20.241069) but was subsequently refused following the appeal process. The main reasons for refusal of planning for each of the developments cited by An Bord Pleanála were issues relating to the lack of certainty in relation to the impact of the proposed development on European Sites in the vicinity of the proposed developments and the qualifying interests for which those European Sites are designated.

1.2 Site Description

The dominant habitat within the boundaries of the proposed Seven Hills Wind Farm I development site is improved agricultural grassland and the proposed site is not designated for nature conservation.

The proposed Seven Hills Wind Farm II development site is a slightly more diverse area in terms of habitat composition with dominant habitats present being improved agricultural grassland, dry calcareous grassland and scrub. The proposed site also does not hold any designations for nature conservation.

There are several Natura 2000 designated sites relating to birds of conservation concern located within 15km of both wind farms. Please see Table 3-1 for further details of these.

1.3 Purpose of the Report

The aim of this report is to provide robust baseline ornithological survey data for the winter period 2018/19 at both phases of the wind farm. These data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed wind farm. The assessment of potential impacts is beyond the scope of this report.

2.0 Methodology

2.1 Desk-based Review

The desk-based review collated available information collected to date on the wintering bird movements in and around the proposed wind farm development sites. This included a review of the following documents submitted as part of the previous planning applications in 2010 and 2012:

- FERS (2010) Proposed Seven Hills Wind Farm Site (Phase I): Ornithological Assessment Report June 2010. Appendix 8.1 of IWCM (2010) Proposed Seven Hills Wind Farm Phase I EIS Chapter 8 – Ornithology;
- FERS (2011) Proposed Seven Hills Wind Farm (Phase II): Ornithological Assessment Report July 2011. Appendix 8.1 of IWCM (2011) Proposed Seven Hills Wind Farm Phase II EIS Chapter 8 – Ornithology;
- Moore Group, FERS and IWCM (2010) Natura Impact Statement and Appropriate Assessment as required under Article 6(3) of the Habitats Directive (Council Directive 92/43/EEC) of Seven Hills Wind Farm Co. Roscommon (Phase I);
- FERS (2010) Response to issues arising from item (5) of a Request for Further Information (RFI) from Roscommon Co. Council (Planning Reference no. 10/541);
- Moore Group, FERS and IWCM (2011) Natura Impact Statement and Appropriate Assessment as required under Article 6(3) of the Habitats Directive (Council Directive 92/43/EEC) of Seven Hills Wind Farm Co. Roscommon (Phase II);
- EcoFact Environmental Consultants Ltd (2012) Seven Hills Wind Farm (Phase I) Co. Roscommon Report to inform the Appropriate Assessment Process; and
- EcoFact Environmental Consultants Ltd (2012) Seven Hills Wind Farm (Phase II) Co. Roscommon Report to inform the Appropriate Assessment Process.

In addition, a review of the following more recent documents which were produced subsequent to the submission of the planning applications was also undertaken:

- EcoFact Environmental Consultants Ltd (2015) Seven Hills Wind Farm, Co. Roscommon Wintering Bird Survey 2014/2015;
- EcoFact Environmental Consultants Ltd (2018) Seven Hills Wind Farms Winter Bird Surveys 2016/17; and
- Inis Environmental Consultants Ltd (2018) Summary Report on Winter 2017/18 Findings at the Proposed Seven Hills I and II Windfarms, Co. Roscommon.

The websites of the National Parks and Wildlife Service (NPWS) www.npws.ie and the National Biodiversity Data Centre (NBDC) http://maps.biodiversityireland.ie/#/Map were also accessed for information on sites designated for nature conservation in the vicinity of the site.

2.2 Field Surveys

The scope of winter bird surveys for the proposed wind farm is based on recommendations given in Scottish Natural Heritage (SNH) 2017[1] guidance. This survey methods guidance is recognised as standard best practice guidance through the UK and Ireland for surveying birds to inform impact assessment of onshore wind farms.

2.2.1 Field Survey Team - Evidence of Technical Competence and Experience

The use of expert observers is a requirement for ornithological surveys and the SLR survey team outlined below are all highly experienced.

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1 SNH (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2.*

Dr Rhys Bullman (RB) – Project Manager and Lead Ornithologist

Rhys is a highly experienced ornithologist and is a Principal Ecologist with SLR while also holding the position of Regional Manager for Scotland and Northern Ireland. Rhys specialises in the impacts of wind farms and transmission infrastructure on birds and has been involved in the provision of ornithological guidance and project management for a wide range of onshore and offshore renewables planning applications throughout the UK. He also provides training to Scottish Natural Heritage (SNH) staff on wind farm ornithology.

Daniel Hulmes (DH) – Lead Bird Surveyor

Daniel is an ornithologist and terrestrial ecologist, supporting the ecology team based in SLR's Stirling office. He has worked on a wide range of projects involving the survey and monitoring of birds both in the UK and internationally. He is also very experienced with protected species surveys and currently holds a Natural England Class 1 Bat Licence. Furthermore, as part of his previous work as an Ecologist, he gained experiencing in managing projects which included a large amount of report writing, survey planning and client interaction.

Andrew Hill (AH) – Assistant Bird Surveyor

Since joining SLR, Andrew has gained six field seasons worth of experience in national and European Protected Species survey, including birds, bats, great crested newts, reptiles, water vole and badger. He is particularly proficient in bird surveys, and regularly undertakes surveys around the UK and Ireland. During this time, he has worked on a diverse range of projects, including quarries, proposed wind farms, proposed solar farms and proposed residential and commercial developments.

2.2.2 Flight Activity Surveys

Vantage point (VP) locations were initially chosen based on locations used during previous surveys (see Section 3.1). These VPs were ground-truthed in the field and the total number of VP locations was reduced from seven to six with one of the VPs moved slightly to a location with better view. The adequacy of these VPs was subsequently checked by carrying out a desk-based viewshed analysis using a bespoke GIS tool for calculating the visible area from each vantage point (VP). The Zones of Theoretical Visibility (ZTV) from each VP were calculated using ArcMAP 10.5.1 Spatial Analyst. The ZTVs were calculated with a surface offset of 30m and from a viewing height of 1.8m above ground level. The terrain model was derived from EU-DEM data with a vertical accuracy of ± 7m. VP locations and viewing arcs are shown in Figure 1 and VP viewsheds are shown in Figure 2. The proposed site layout is also shown in Figures 1 and 2.

A total of 36 hours of watches were undertaken at each of the six vantage point locations during the winter season (monthly visits October – March inclusive). This equates to a total of six hours per VP per month. Table 2-1 provides a summary of the survey effort at each VP during the winter of 2018/2019.

Table 2-1: VP survey effort undertaken during flight activity surveys from each VP at the two proposed Seven Hills Wind Farm sites October 2018 to March 2019 (hrs:mins).

Month	WFI VP1	WFI VP2	WFII VP1	WFII VP2	WFII VP3	WFII VP4
October	6:00	6:00	6:00	6:00	6:00	6:00
November	6:00	6:00	6:00	6:00	6:00	6:00
December	6:00	6:00	6:00	6:00	6:00	6:00
January	6:00	6:00	6:00	6:00	6:00	6:00
February	6:00	6:00	6:00	6:00	6:00	6:00

Month	WFI VP1	WFI VP2	WFII VP1	WFII VP2	WFII VP3	WFII VP4
March	6:00	6:00	6:00	6:00	6:00	6:00
Total hrs	36:00	36:00	36:00	36:00	36:00	36:00
VP grid locations (**Figure 1**)	587337 E 748665 N	585834 E 746017 N	588967 E 745061 N	587372 E 743512 N	590643 E 743279 N	592160 E 743701 N

It is good practice to ensure that where possible each monthly six-hour survey period should be split over more than a single day and spread across different times of the day. As such, the six-hour survey periods were divided into three-hour blocks which were alternated across consecutive days e.g. on day 1, VP1 would be completed in the morning and VP2 would be completed in the afternoon and on day 2, VP2 would be completed in the morning and VP1 in the afternoon. Breaks of at least 30 minutes were taken between watches to minimise observer fatigue. Details of survey dates, times and observers are provided in Appendix I and a record of weather conditions during surveys is provided in Appendix II.

VP watches aimed to quantify the flight activity of primary and secondary target species (as defined in Section 2.2.2.1) within the study area.

The main purpose of VP watches is to collect data on primary target species that will enable estimates to be made of:

- The time spent flying over the site;
- The relative use by birds of different parts of the site;
- The proportion of flying time spent within the provisional upper and lower risk height limits as determined by the potential rotor diameter and rotor hub height; and
- Ultimately, the analysis of the potential risk of collision of birds with rotating turbines.

For each primary target species observation, the following details were recorded:

- Time of observation;
- Species, age and sex (where determinable);
- Number of birds observed per bout;
- Duration of flying bout;
- Time spent within each height band and;
- Notes on observation.

In the absence of detailed information regarding turbine specifications at the time of undertaking the surveys, the recording height bands were determined based on the turbine specifications included in the previous application (tip height 135m, lowest rotor swept height 35m) plus a bit extra to allow some flexibility. Flight heights were therefore attributed to three distinct height bands as follows:

- 1 = < 30m (below the likely rotor swept area);
- 2 = 30m to 150m (the likely rotor swept area);
- 3 = > 150m (above the likely rotor swept area).

In addition, a summary of observations of secondary target species (see Section 2.2.2.1) was recorded at the end of each five-minute period during each VP watch to provide an index of flight activity for secondary target species within the site, in accordance with current SNH guidance. Data collected on secondary species included:

- The five-minute period start and end time;
- Species;
- Number of birds observed;
- If flying, the height band in which birds were observed flying;
- Whether birds were observed onsite, in the 500m buffer or beyond;
- Flight behaviour; and
- Notes on observation.

2.2.2.1 Target Species

Target species for the surveys were defined by legal and/or conservation status and vulnerability to impacts caused by wind turbines, as defined in SNH Guidance (2017).

Primary Target Species

The target species for these VP surveys included all raptors, all waders and all waterfowl (duck, geese, swans), excluding feral species such as Canada goose *Branta canadensis*.

Secondary Target Species

Secondary target species included:

- Raven *Corvus corax*;
- Grey heron *Ardea cinerea*;
- Cormorant *Phalacrocorax carbo*;
- Gulls *Larus* sp., and;
- Any other non-passerine species of conservation concern.

2.2.3 Swans and Goose Feeding Distribution Surveys

SNH (2017) recommends that for whooper swan *Cygnus cygnus*, Greenland white-fronted goose *Anser albrifrons flavirostris* and other goose species, feeding distribution surveys should be undertaken in areas of suitable habitat when the survey area lies within the core foraging distance of SPAs for these species or other major roosts unless it can be established from existing data that the area is not utilised for feeding.

Feeding distribution surveys were carried out on a monthly basis to establish if swans and geese were using the fields within 1 km of the wind farm boundary. Whooper swan and Greenland white–fronted goose are features of interest of several Special Protection Areas (SPAs) within 15 km of the site boundary (see Table 3-1). A buffer of 1 km around both wind farm sites was used for these surveys which were undertaken by driven transect, stopping on a regular basis to check all fields for goose and swan feeding activity. An initial survey was undertaken in October 2018 and repeated on a monthly basis until March 2019.

The survey area is shown in Figure 3. Details of survey dates, times and observers are provided in Appendix I and a record of weather conditions during surveys is provided in Appendix II.

2.3 Survey Limitations

The majority of vantage point surveys were undertaken in optimal weather conditions. However, during such an extensive series of surveys carried out over the winter period it was inevitable that some surveys were completed in suboptimal conditions. There were 15 hours out of the total of 216 during which the visibility was recorded as “moderate” i.e. 1-3km and 2 non-consecutive hours during which the visibility was “poor” i.e. less than 1km. This comprises 7.9% of the total survey season and in most cases all of the relevant 2km viewing arc was visible. As such, this does not significantly affect the validity of the data collected. Please see details in Appendix II.

As shown in Figure 2, due to local topographical conditions a small area at the western end of Wind Farm I and a very small area within the 500m buffer zone for Wind Farm II were not within the 2km viewsheds from any of the VPs. All proposed turbine locations and the vast majority of the 500m buffer were visible from at least one VP however and the gaps in coverage are therefore not considered to represent a significant limitation.

In accordance with the standard methodology, the swan and goose feeding distribution surveys were carried out from public roads without any access to land and as such, not all fields were visible within the 1km survey area. This was a limitation in that there is a possibility that some feeding flocks may have been out of sight. However, any additional swans or geese which were potentially not recorded during the feeding distribution surveys would have most likely been observed moving between foraging grounds during the remainder of the survey or during the vantage point surveys and it is therefore considered unlikely that significant feeding flocks were overlooked.

3.0 Results

3.1 Desk-based Review

3.1.1 Natura 2000 Sites

There are no Special Protection Areas (SPA) within the proposed wind farm sites. However, there are a total of five SPAs within a 15 km[2] radius of the survey area. The five SPAs within 15km are shown in Table 3-1, which also shows the qualifying interests for each site. For the purposes of this report, which deals specifically with wintering birds, qualifying interests which are only present during the breeding season have been excluded from Table 3-1.

Table 3-1: SPAs within 15km of Seven Hills Wind Farms 1 and 2 and their qualifying interests (species present during the winter period only)

Site Name	Site Code	Distance/ Direction from Site Boundary	Wintering Species of Special Conservation Interest
Lough Croan Turlough SPA	004139	1.5km north	• Shoveler *Anas clypeata* • Golden Plover *Pluvialis apricaria* • Greenland White-fronted Goose *Anser albifrons flavirostris* • Wetland and Waterbirds
River Suck Callows SPA	004097	1.7km west	• Whooper Swan *Cygnus cygnus* • Wigeon *Anas penelope* • Golden Plover *Pluvialis apricaria* • Lapwing *Vanellus vanellus* • Greenland White-fronted Goose *Anser albifrons flavirostris* • Wetland and Waterbirds
Four Roads Turlough SPA	004140	1.9km north	• Golden Plover *Pluvialis apricaria* • Greenland White-fronted Goose *Anser albifrons flavirostris* • Wetland and Waterbirds
Lough Ree SPA	004064	8km east	• Little Grebe *Tachybaptus ruficollis* • Whooper Swan *Cygnus cygnus* • Wigeon *Anas penelope* • Teal *Anas crecca* • Mallard *Anas platyrhynchos* • Shoveler *Anas clypeata* • Goldeneye *Bucephala clangula* • Coot *Fulica atra* • Golden Plover *Pluvialis apricaria* • Lapwing *Vanellus vanellus* • Wetland and Waterbirds

[2] 15 km is the maximum distance typically applied when considering wildfowl ranging from roost sites to foraging sites (SNH, 2017).

Site Name	Site Code	Distance/ Direction from Site Boundary	Wintering Species of Special Conservation Interest
Middle Shannon Callows SPA	004096	11.4km southeast	• Whooper Swan *Cygnus cygnus* • Wigeon *Anas penelope* • Golden Plover *Pluvialis apricaria* • Lapwing *Vanellus vanellus* • Black-tailed Godwit *Limosa limosa* • Black-headed Gull *Chroicocephalus ridibundus* • Wetland and Waterbirds

3.1.2 Previous Survey Data

Winter bird surveys were undertaken at Wind Farms I and II during the winter seasons of 2008/09, 2009/10, 2011/12, 2014/15, 2016/17 and 2017/18. A review of the previous winter bird survey reports listed in Section 2.1 revealed that a variety of bird survey methods were used across the six survey seasons. Surveys carried out each year at each wind farm site are described below together with a short summary of the survey results. The relevant reports should be referred to for further details.

During the survey period November 2008 – February 2009, the site was visited four times per month (FERS 2010; FERS 2011). On each of these occasions, five vantage points were visited for a period of 20 minutes throughout the day (three at Wind Farm I and two at Wind Farm II). During the surveys at Wind Farm I, a total of four species of red-listed status (Lynas *at al.*, 2009) were observed using the proposed development site, namely black-headed gull, curlew *Numenius arquata*, golden plover and lapwing. Six species of amber status were observed using the proposed development site, namely whooper swan, starling *Sturnus vulgaris*, house sparrow *Passer domesticus*, swallow *Hirundo rustica*, snipe *Gallinago gallinago* and linnet *Carduelis cannabina*. During surveys at Wind Farm II, a total of six red-listed species were recorded within the proposed development site namely pintail *Anas acuta*, shoveler, black-headed gull, curlew, golden plover and lapwing. A total of 17 amber-listed species were observed at Wind Farm II. In addition to the same six amber-listed species as observed at Wind Farm I, Bewick's swan *Cygnus columbianius,* mute swan *Cygnus olor,* wigeon, pochard *Aythya ferina,* tufted duck *Aythya fuligula,* teal, shelduck *Tadorna tadorna*, dunlin *Caladris alpina,* coot, lesser black-backed gull *Larus fuscus* and kestrel were also recorded within the site. Of these species, only two were evaluated as "potentially threatened" by the proposed wind farms, namely curlew and whooper swan.

Targeted whooper swan surveys were carried out twice monthly during the winter periods October 2009 – April 2010 (at both Wind Farms I and II) and November 2010 – February 2011 (Wind Farm II only) (FERS 2010; FERS 2011). These surveys were undertaken to determine if whooper swans flew through the area in which the turbines were proposed to be sited. Methods were based on Larsen and Clausen (2002). Observations were carried out from one vantage point within the Wind Farm I site in 2009/10 and three vantage points within Wind Farm II during the 2009/10 and 2010/11 seasons. Surveys at Wind Farm I in 2009/10 yielded observations of three flocks of whooper swan (n=5, n=3 and n=4) flying through the Wind Farm I site within a single survey period in February 2010. The three flocks were observed flying at heights of 15-20m. These were the only sightings of whooper swan at Wind Farm I throughout the winter season 2009/10. Surveys at Wind Farm II during the same season, yielded two observations of whooper swan flocks flying through the wind farm site, with one flock of seven recorded in December 2009 and a second flock of 17 recorded in February 2010. Both flocks were observed flying at heights of 10-20m above ground level.

During the 2010/11 whooper swan surveys undertaken at Wind Farm II, there were two records of whooper swan flying through the wind farm site. The first was of a flock of four observed in December 2010 flying towards Feacle Lough at a height of 30-40m, while the second, observed in February 2011, was of a flock of six whooper swan flying through the site at 5-10m height. There were also two observations of peregrine falcon recorded flying through the site during these surveys in December and February.

The methodology used in 2009/10 and 2010/11 was repeated twice monthly at both wind farm sites between December 2011 and February 2012 by FERS (data presented in Appendix 7 of the NIS (Ecofact, 2012)). During the 2011/12 survey season, a single whooper swan was recorded flying through the proposed location of the turbines at Wind Farm I at a height of 5m. This was the only sighting of whooper swan during those three months of surveying. An unspecified number of golden plovers were also recorded feeding in fields north of the proposed turbine locations in rough grassland during February 2012. At Wind Farm II, there were five flocks of whooper swan recorded flying through the site during December (n=4) and February (n=2; n=3; n=2 and n=4). All five flocks were recorded flying at heights of 5-15m.

Further winter surveys were undertaken at Wind Farms I and II from October 2014 to March 2015 (Ecofact, 2015). These surveys involved assessing an extensive area surrounding the proposed wind farm sites, which covered a large proportion of South Roscommon and encompassed waterbodies including Lough Croan Turlough SPA, Lough Feacle Turlough, Coolagarry Lough, Thomas Street Turlough and Four Roads Turlough SPA as well as the Ballyglass River Callows and other minor season waterbodies. The aim of the survey was to record the distribution of waterbirds in the region, primarily Greenland white-fronted geese, whooper swans and golden plover. Vantage point surveys targeting the proposed development sites were also undertaken from two vantage points, one at each proposed wind farm site. Although there were peak numbers of 42-48 whooper swans observed grazing on the grasslands surrounding Thomas Street Turlough, approximately 1.5km south of Wind Farm I, on two occasions (February and March 2015), there was only one observation of whooper swan recorded flying through Wind Farm I throughout the winter season. This observation was in November when a flock of nine whooper swan was recorded leaving Thomas Street turlough and flying in the direction of Lough Croan Turlough at dusk. There were two records of whooper swans flying through the Wind Farm II site between Feacle Lough and Ballyglass River Callows in February (n=52) and March (n=63). Throughout the season, flocks of whooper swan ranging in size from 4-78 were observed at various waterbodies within a 15km radius of both wind farm sites. Flocks of 21-79 Greenland white-fronted geese were observed in November (n=21), December (n=29) and March (n=79) at the Muckanagh Callows along the River Suck, which is approximately 5km to the northwest of the Wind Farm I site. There were no Greenland white-fronted geese observed flying through the wind farm sites throughout the winter season of 2014/15.

The winter 2016/17 surveys were undertaken at both wind farm sites from November 2016 to March 2017 (EcoFact, 2018). The approach followed that of the 2014/15 surveys i.e., to establish whether birds used or crossed the sites, and attempted to explain their movements when they were not interacting with the sites. As with previous surveys, the study focused primarily on species such as whooper swan and Greenland white-fronted geese, while also providing full counts and assessments for all other water birds. The wintering bird survey used two main vantage points, one at each proposed wind farm site and followed SNH guidance in place at that time (SNH, 2014) with a minimum of 6 hours per vantage point per month. Up to 10 other sites within the surrounding area were also visited at least twice per month and full counts undertaken on each visit. The survey was adaptive, as before, and was extended up to 10km+ away from the proposed wind farm site as necessary. Results showed that there was no significant bird activity recorded within either proposed development site during the November survey. This was attributed to the low water levels across the study area with all the turloughs very low or dry. In December 2016, the only notable observations were a sighting of a small flock of Greenland white-fronted geese on the River Suck, along with the large numbers of starlings which were resident on Lough Croan. No whooper swans were recorded during the December visit. During January 2017, a flock of c.60 golden plover were recorded passing near the Wind Farm I site and a flock of 32 curlew was recorded flying near Wind Farm II and landing on Lough Feacle (flight heights not reported). It was reported that water levels at Lough Croan remained low and there were no whooper swans present. However, there were increased numbers of ducks present with significant numbers of wigeon, teal, and shoveler recorded at Lough Croan. During the January vantage point watch on Wind Farm I, a merlin was recorded crossing the site. A total of 40 golden plover and 100 lapwing were recorded passing near the Wind Farm I site (location and direction not reported), with one snipe recorded within the site in January 2017. There were no records of whooper swans or Greenland white-fronted geese using or passing through the Wind Farm I site during February 2017 surveys.

Again, there were no movements of whooper swan or Greenland white-fronted geese recorded passing through or near the proposed either wind farm site during the March 2017 surveys. Whooper swan flocks were recorded at several waterbodies surrounding both wind farm sites in March 2017, namely Lough Croan, River Suck at Muckinagh North, Coolagarry turlough, Brideswell and Ballyglass River Callows. A total of 80 Greenland white-fronted geese were also recorded at the River Suck at Muckinagh north.

The 2017/18 surveys again followed SNH (2014) guidance with flight activity surveys undertaken from October 2017 to March 2018. Seven vantage points across the two wind farm sites (two at Wind Farm I and five at Wind Farm II) were used at which monthly flight activity surveys were undertaken at dawn and dusk only. Monthly wildfowl distribution surveys were also undertaken, although the area over which these were undertaken was unspecified within the report. Results showed that kestrel and sparrowhawk were the only two target species recorded using the Wind Farm II site during vantage point surveys on one occasion each. There were no other records of target species recorded at either wind farm throughout the entire survey season. A range of wildfowl was recorded during the monthly distribution surveys at locations surrounding both wind farm sites, namely whooper swan, mute swan, lapwing, curlew, golden plover, wigeon and teal. There were no flights of swan species observed flying through the proposed rotor swept areas.

3.2 Flight Activity Surveys

Flight lines of primary target species recorded at both wind farm sites throughout the winter season are presented in Figures 4-9. Flight data for primary target species and summary data for secondary target species are provided in Appendix III.

3.2.1 Primary Target Species

3.2.1.1 Wind Farm I: Vantage Points 1 and 2

At least six primary target species were recorded flying within the study area on and around Wind Farm I during the survey period. The primary target species recorded are presented in Table 3-2, alongside the total number of birds recorded from both VPs and the total number of flights recorded.

Table 3-2: Primary target species flights recorded from WFI VPs 1 and 2 - October 2018 to March 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Whooper swan	21	2
Greenland white-fronted goose	19	2
Unidentified goose sp.	100	1
Golden plover	92	2
Snipe *Gallinago gallinago*	2	2
Buzzard *Buteo buteo*	1	1
Sparrowhawk *Accipiter nisus*	4	3
Total	**239**	**13**

All primary target species recorded at Wind Farm I, with the exception of a distant, high up flock of unidentified geese, spent at least 15 seconds of at least one of their flights in Height Band 2 (the likely rotor swept area).

Greenland white-fronted goose and whooper swan spent up to 90 and 120 seconds, respectively, in Height Band 2 on two flights.

A flock of 40 golden plover was recorded during the October survey, spending most of the recorded flight in Height Band 3. A flock of 52 golden plover were also recorded at Wind Farm I in January in Height Band 2.

Only two species of raptor were recorded at the site (buzzard and sparrowhawk) with only one observation of buzzard recorded in February, spending a total of 30 seconds within Height Band 2.

3.2.1.2 Wind Farm II: Vantage Points 1 – 4

In total, 13 primary target species were recorded flying through the Wind Farm II site during the survey period. The primary target species recorded are shown in Table 3-3 alongside the total number of birds seen from all VPs combined and the total number of flights recorded.

Table 3-3: Primary target species flights recorded from WFII VP1 – VP4 – October 2018 to March 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Whooper swan	32	6
Golden plover	11	2
Curlew	212	14
Lapwing	149	11
Snipe	7	4
Wigeon	15	1
Mallard	7	2
Teal	36	3
Hen harrier	1	1
Peregrine falcon	5	5
Kestrel	2	2
Sparrowhawk	1	1
Buzzard	2	2
Total	**480**	**54**

There was slightly more diversity in raptor and wader species recorded at Wind Farm II than at Wind Farm I, with five species of raptor and four species of wader observed throughout the winter period.

Whooper swan flight behaviour was similar to that recorded at Wind Farm I, with small flocks ranging from 1-4 individuals occasionally passing through the site within and above Height Band 2. There was one larger flock of 21 whooper swan recorded at this site during the season, which was observed within Height Band 1. There were no Greenland white-fronted geese recorded at Wind Farm II throughout the winter period.

The records of peregrine were all recorded within the 500 m buffer and not within the site boundary. There was one brief record (45 seconds) of a transient hen harrier on passage through the site in November.

In terms of waders, Wind Farm II was utilized as a foraging ground by wintering curlew (mean flock size n = 15; range: 1-38). Given that their primary behaviour was feeding in the fields around the site, the majority of flights were recorded in Height Band 1. Similarly, flocks of wintering lapwing ranging from 2-26 individuals (mean n = 10) were recorded foraging within the wind farm site. There were only two brief observations of golden plover recorded from VP3 during October and November, both of which were in Height Band 1. Occasional records of snipe were recorded in October and February only.

3.2.2 Secondary Target Species

There were seven secondary target species recorded at both proposed wind farm sites combined. Please see Table 3-4 for a list of these species alongside the total number of birds recorded and the total number of flights of each species observed.

Raven was the most commonly recorded secondary target species observed at both sites combined with 104 observations and a total of 186 birds, whilst black-headed gull was the most abundant across both sites with a total of 625-670 individuals recorded during 43 observations. Flock sizes of black-headed gull ranged from 1-150 individuals with the majority of flocks flying within Height Band 1.

There were four further species of gull recorded through the season namely, common gull, great black-backed gull, lesser black-backed gull and herring gull, all of which were recorded infrequently in low numbers.

A single flock of six Canada geese were observed from VP3 in February flying within Height Band 1.

Table 3-4: Secondary target species and flights recorded from WFI VPs 1 and 2 and WFII VPs 1-4 - October 2018 to March 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Canada Goose	6	1
Black-headed gull	625-670	43
Great black-backed gull	6	4
Common Gull	2	1
Lesser-black backed gull	9	5
Herring Gull	38	2
Raven	186	104
Total	**872-917**	**160**

3.3 Swan and Goose Feeding and Distribution Surveys

There were no whooper swans recorded within 1 km of the wind farm sites during the October, November, December and February feeding and distribution surveys.

A peak count of 154 whooper swans was recorded on the feeding and distribution survey, located on a field near Cuilleenirwan Lough, east of Wind Farm I and outside the 1km survey buffer, in January 2019. Whooper swans were observed feeding in fields at two other locations during the January feeding distribution surveys, including 105 swans observed within the 1km buffer northwest of Wind Farm II and 21 swans were observed feeding within the Wind Farm II survey buffer to the southeast.

During the March survey, a flock of 12 whooper swans was recorded feeding in an improved agricultural grassland field north of the R363 road, south of Wind Farm I. 14 whoopers swans were also recorded at the south-eastern corner of Lough Croan Turlough north of Wind Farm I.

Please see Figure 3 for the distribution of all whooper swans recorded.

There were no Greenland white-fronted geese recorded within 1 km of either of the proposed wind farm sites throughout the entire season of feeding and distribution surveys.

4.0 Summary and Conclusions

The aim of this report is to provide baseline ornithological survey data for the 2018/2019 winter season at the two proposed wind farm sites at Seven Hills, Dysart, Co. Roscommon. These data will be used to inform the ecological impact assessment and appropriate assessment for the proposed wind farms. The assessment of potential effects of the proposed wind farms is beyond the scope of this report.

The winter bird survey methods employed during the 2018/2019 survey season were based on recommendations given in SNH (2017) guidance. This survey methods guidance is recognised as standard best practice guidance through the UK and Ireland for surveying birds to inform impact assessment of onshore wind farms. Winter season surveys were undertaken from October 2018 to March 2019. The following ornithological survey types were undertaken at the proposed Seven Hills Wind Farm development sites:

- Flight activity (VP) surveys;
- Swan and goose feeding and distribution surveys.

Flight activity surveys were undertaken from two vantage points overlooking Wind Farm I and four vantage points overlooking Wind Farm II. These vantage points were visited for six hours per month. This resulted in a total survey effort of 36 hours per vantage point throughout the season.

Swan and goose feeding and distribution surveys were repeated monthly across the season. A buffer of minimum 1 km around each wind farm site was used for these surveys, which were undertaken by driven transect, stopping on a regular basis to check fields for goose and swan feeding activity.

The following primary target species were recorded during flight activity surveys at both proposed wind farm sites combined:

- Whooper swan;
- Greenland white-fronted goose;
- Wigeon;
- Mallard;
- Teal;
- Golden plover;
- Lapwing;
- Curlew;
- Snipe;
- Hen harrier;
- Buzzard;
- Sparrowhawk;
- Kestrel; and
- Peregrine falcon.

The most frequent flight activity at Wind Farm I was by sparrowhawk (three flights) and at Wind Farm II was by curlew (14 flights), with other primary target species activity less frequent. The next most frequently recorded species was lapwing (11 flights recorded at WFII). All other primary target species were recorded six times or less.

In relation to SPA species, there were no records of Greenland white-fronted geese from any of the VP watches at Wind Farm II or the feeding and distribution surveys throughout the entire season. There were two records of Greenland white-fronted geese on passage through Wind Farm I, one in October and one in November.

Whooper swans were recorded during VP surveys at both sites through the season, however, not in any significant numbers or frequencies (two records totalling 21 birds at Wind Farm I and six records totalling 32 birds at Wind Farm II).

A flock of 40 golden plover was recorded during the October survey at Wind Farm I, spending most of the recorded flight above the likely rotor swept area and a flock of 52 was recorded there in January, this time within the likely rotor swept area. There were also two brief observations of golden plover recorded at Wind Farm II during October and November totalling 11 birds, both of which were below the likely rotor swept area. There were 11 records of lapwing at Wind Farm II, totalling 149 birds and lapwing were also recorded foraging within the Wind Farm II site in small flocks. There was also one record of wigeon (15 birds), two records of mallard (seven birds) and three records of teal (36 birds) at Wind Farm II.

There were five records of peregrine at Wind Farm II. However, all of these flights were recorded within the 500 m buffer and not within the site boundary. There was a single brief record of a transient hen harrier on passage through Wind Farm II in November. There were no Annex I raptor species recorded at Wind Farm I.

Wind Farm II was utilized as a foraging ground by wintering curlew, however, curlew was not recorded flying within the likely rotor swept area. Occasional records of snipe were recorded in October and February only.

Results from the current survey are broadly comparable with surveys undertaken at the site during the previous winters, despite differences in methods and survey effort, in that relatively low numbers and frequencies of sightings of species of special conservation concern were reported within the wind farm sites.

5.0 References

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6.0 Figures

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

Lough Croon

Culleenirwon Lough

Curraghboy

Dysart

County Roscommon

County Galway

Shruk

R357 R363 R362 L2013 L2015 L2016 L2018 L2028 L2025

N

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Vantage Point
- Vantage Points 2km View Arc

Ballyhaunis Castlerea Strokestown Newtownforbes Longford Edgeworthstown Roscommon Ballymahon Mountbellew Athlone Moate Ballinasloe Clara Athenry Ferbane Cloghan Loughrea Banagher Kilcormac

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FIGURE 1 - VANTAGE POINT LOCATIONS

Scale 1:35,000 @ A3

Date MAY 2022

0 1 2 Kilometres

02036.00633.0020.0 Vantage Point Survey Proposed Wind Farms

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

Lough Croan

Culleenirwon Lough

Curraghboy

Dysart

County Roscommon

County Galway

L2013 L2016 L2015 L2018 L2028 L2025

R357 R363 R362

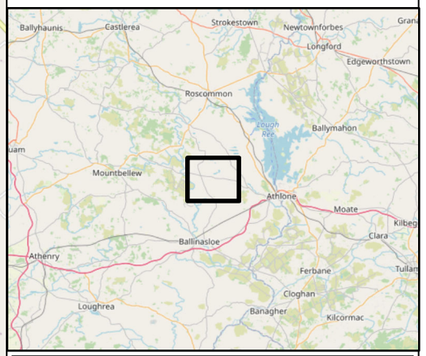
N

NOTE

1. The Zones of Theoretical Visibility (ZTV) was calculated using ArcMAP 10.5.1 Spatial Analyst. The ZTV is calculated with a surface offset 30m & from a viewing height of 1.8m above ground level. The terrain model is derived from EU-DEM data with a vertical accuracy of ± 7m.

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Vantage Point
- Distance of Viewing Arc
- Theoretical Visibility from Wind Farm 1 VP1
- Theoretical Visibility from Wind Farm 1 VP2
- Theoretical Visibility from Wind Farm 2 VP1
- Theoretical Visibility from Wind Farm 2 VP2
- Theoretical Visibility from Wind Farm 2 VP3
- Theoretical Visibility from Wind Farm 2 VP4



0 1 2

Kilometres

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FIGURE 2 - VANTAGE POINTS OVERLOOKING WINDFARMS I AND II

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.0015.0 Viewsheds from Vantage Points Overlooking Windfarms I and II - 30m Offset

584000 586000 588000 590000 592000 594000

750000 748000 746000

N

LEGEND

- Turbine Location
- Site Infrastructure
- Peat Count - Feeding Whooper Swan
- Transect Route
- Feeding Distribution Survey Area

WIND FARM 1

WIND FARM 2

14 154 12 105 21

Lough Croan

Curraghboy

L2013 L2016 L2015 L2018 L2017 L2028 R357 R362 R363

0 1 2

Kilometres

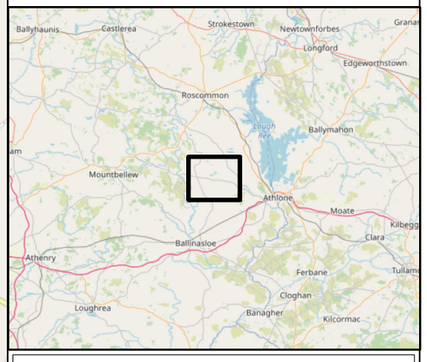

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FIGURE 3 - SWAN AND GOOSE FEEDING DISTRIBUTION SURVEY – PEAK COUNTS

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.0021.0 Swan and Goose Feeding Distribution Survey Winter 2018_2019 - Peak Counts

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

N

0 1 2
Kilometres

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Curlew
- Golden Plover
- Lapwing
- Peregrine
- Sparrowhawk
- Snipe
- White-fronted Goose
- Whooper Swan

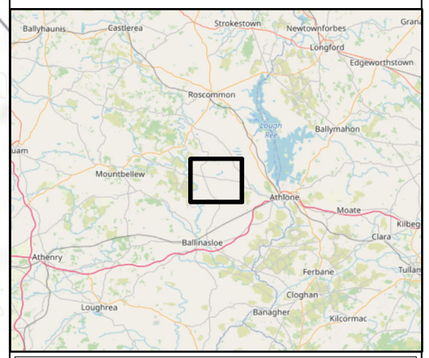

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FIGURE 4 - FLIGHT PATHS OCTOBER 2018

Scale	Date
1:35,000 @ A3	MAY 2022

02036.00633.0027.0 Flight Paths - October 2018

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

N

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Curlew
- Golden Plover
- Hen Harrier
- Lapwing
- Peregrine
- Teal
- White-fronted Goose
- Whooper Swan

0 1 2
Kilometres

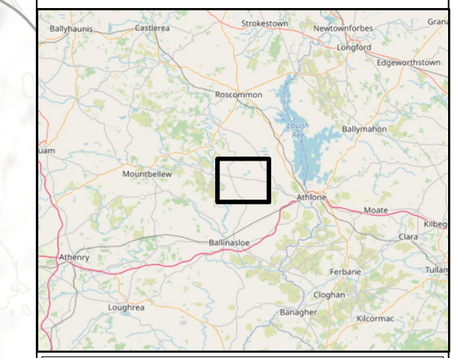

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FIGURE 5 - FLIGHT PATHS NOVEMBER 2018

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.0026.0 Flight Paths - November 2018

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

N

0 1 2
Kilometres

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Peregrine
- Sparrow Hawk

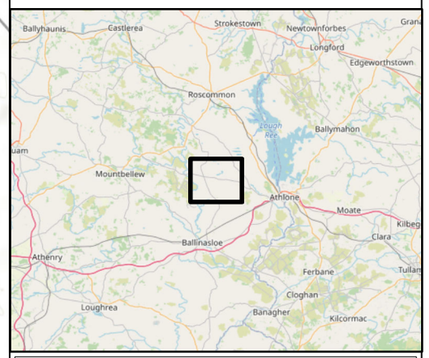

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FIGURE 6 - FLIGHT PATHS DECEMBER 2018

Scale	Date
1:35,000 @ A3	MAY 2022

02036.00633.0022.0 Flight Paths - December 2018

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

N

0 1 2
Kilometres

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Curlew
- Golden Plover
- Mallard
- Peregrine
- Teal
- Whooper Swan

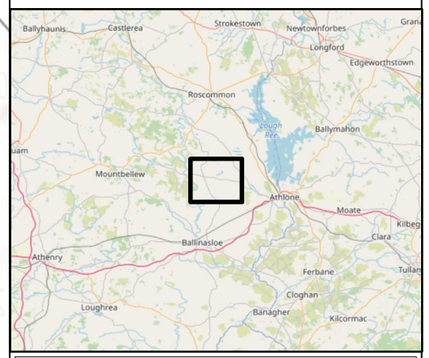

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FIGURE 7 - FLIGHT PATHS JANUARY 2019

Scale	Date
1:35,000 @ A3	MAY 2022

02036.00633.0024.0 Flight Paths - January 2019

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

N

0 1 2
Kilometres

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Buzzard
- Curlew
- Kestrel
- Sparrowhawk
- Snipe
- Unidentified Goose Sp.

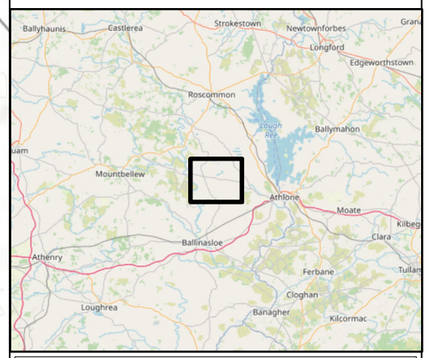

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FIGURE 8 - FLIGHT PATHS FEBRUARY 2019

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.0023.0 Flight Paths - February 2019

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

N

0 1 2
Kilometres

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Kestrel
- Lapwing
- Mallard
- Teal
- Wigeon

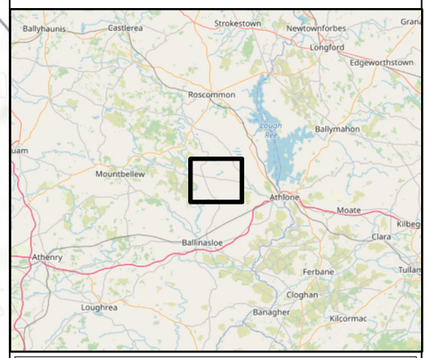

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FIGURE 9 - FLIGHT PATHS MARCH 2019

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.0025.0 Flight Paths - March 2019

APPENDIX I

Survey dates, times and observers

Table AI-1: Details of VP surveys undertaken from Wind Farm I Vantage Point 1

Date	Surveyor	Start	End	Survey Duration
25/10/2018	DH	09:45	12:45	3
29/10/2018	DH	13:00	16:00	3
20/11/2018	AH	09:30	12:30	3
22/11/2018	DH	13:00	16:00	3
06/12/2018	DH	12:50	15:50	3
09/12/2018	DH	09:15	12:15	3
18/01/2019	DH	09:30	12:30	3
21/01/2019	AH	13:05	16:05	3
15/02/2019	DH	09:30	12:30	3
17/02/2019	DH	14:05	17:05	3
12/03/2019	RB	13:50	16:50	3
15/03/2019	DH	14:00	17:00	3
Total Hours				**36**

Table AI-2: Details of VP surveys undertaken from Wind Farm I Vantage Point 2

Date	Surveyor	Start	End	Survey Duration
25/10/2018	AH	09:20	12:20	3
26/10/2018	DH	13:30	16:30	3
20/11/2018	DH	09:30	12:30	3
22/11/2018	DH	09:30	12:30	3
06/12/2018	DH	09:15	12:15	3
09/12/2018	DH	13:00	16:00	3
15/01/2019	RB	13:30	16:55	3
21/01/2019	RB	10:00	13:00	3
15/02/2019	RB	09:45	12:45	3
17/02/2019	RB	11:15	14:15	3
12/03/2019	AH	14:00	17:00	3
16/03/2019	DH	08:50	11:50	3
Total Hours				**36**

Table AI-3: Details of VP surveys undertaken from Wind Farm II Vantage Point 1

Date	Surveyor	Start	End	Survey Duration
25/10/2018	AH	09:40	12:40	3
29/10/2018	AH	08:50	11:50	3
20/11/2018	AH	09:20	12:20	3
22/11/2018	AH	12:40	15:40	3
06/12/2018	AH	13:00	16:00	3
09/12/2018	DH	09:10	12:10	3
18/01/2019	AH	13:55	16:55	3
21/01/2019	DH	12:50	15:50	3
15/02/2019	RB	14:00	17:15	3
17/02/2019	RB	13:40	16:40	3
12/03/2019	RB	07:45	11:00	3
13/03/2019	RB	12:00	15:00	3
Total Hours				**36**

Table AI-4: Details of VP surveys undertaken from Wind Farm II Vantage Point 2

Date	Surveyor	Start	End	Survey Duration
25/10/2018	DH	13:30	16:30	3
28/10/2018	DH	09:00	12:00	3
22/11/2018	DH	09:30	12:30	3
23/11/2018	DH	13:10	16:10	3
07/12/2018	DH	09:15	12:15	3
10/12/2018	DH	12:30	15:30	3
16/01/2019	DH	13:55	16:55	3
19/01/2019	DH	12:50	15:50	3
13/02/2019	DH	09:15	12:15	3
18/02/2019	RB	09:45	12:45	3
11/03/2019	DH	09:00	12:00	3
14/03/2019	RB	12:00	15:00	3
Total Hours				**36**

Table AI-5: Details of VP surveys undertaken from Wind Farm II Vantage Point 3

Date	Surveyor	Start	End	Survey Duration
26/10/2018	DH	13:30	16:30	3
29/10/2018	DH	09:00	12:00	3
20/11/2018	DH	09:30	12:30	3
23/11/2018	DH	13:10	16:10	3
07/12/2018	DH	13:15	16:15	3
10/12/2018	DH	09:00	12:00	3
16/01/2019	DH	09:15	12:15	3
17/01/2019	DH	13:15	16:15	3
15/02/2019	DH	12:30	15:30	3
18/02/2019	DH/RB	12:30	15:30	3
12/03/2019	DH	13:55	16:55	3
16/03/2019	DH	12:50	15:50	3
Total Hours				**36**

Table AI-6: Details of VP surveys undertaken from Wind Farm II Vantage Point 4

Date	Surveyor	Start	End	Survey Duration
26/10/2018	AH	09:10	12:10	3
29/10/2018	AH	12:40	15:40	3
20/11/2018	AH	13:01	16:01	3
23/11/2018	AH	09:25	12:25	3
07/12/2018	AH	09:25	12:25	3
08/12/2019	AH	13:10	16:10	3
18/01/2019	AH	12:55	15:55	3
19/01/2019	AH	09:12	12:12	3
17/02/2019	DH	10:07	13:07	3
18/02/2019	DH	09:40	12:40	3
16/03/2019	DH	07:50	10:50	3
17/03/2019	DH	12:50	15:50	3
Total Hours				**36**

APPENDIX II

Weather Data

Table AII-1: Weather data collected during flight activity surveys undertaken at WFI VP1

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
25/10/2018	DH	09:45	12:45	1	3	NE	2	8	2	2	0	0	10
25/10/2018	DH	09:45	12:45	2	3	NE	0	7	2	2	0	0	10
25/10/2018	DH	09:45	12:45	3	4	NE	0	7	2	2	0	0	10
29/10/2018	DH	13:00	16:00	1	3	E	0	8	2	2	0	0	7
29/10/2018	DH	13:00	16:00	2	3	E	0	8	2	2	0	0	8
29/10/2018	DH	13:00	16:00	3	3	E	0	8	2	2	0	0	8
20/11/2018	AH	09:30	12:30	1	3	N	0	4	2	2	0	0	5
20/11/2018	AH	09:30	12:30	2	2	N	0	4	2	2	0	0	6
20/11/2018	AH	09:30	12:30	3	2	N	0	4	2	2	0	0	6
22/11/2018	DH	13:00	16:00	1	2	SE	0	5	2	2	0	0	5
22/11/2018	DH	13:00	16:00	2	2	SE	0	0	2	2	0	0	5
22/11/2018	DH	13:00	16:00	3	2	SE	0	1	2	2	0	0	4
06/12/2018	DH	12:50	15:50	1	3	NE	0	8	2	2	0	0	10
06/12/2018	DH	12:50	15:50	2	4	NE	1	8	2	2	0	0	10
06/12/2018	DH	12:50	15:50	3	4	NE	0	6	2	2	0	0	9
09/12/2018	DH	09:15	12:15	1	4	NW	0	0	2	2	0	0	8
09/12/2018	DH	09:15	12:15	2	4	NW	0	0	2	2	0	0	7
09/12/2018	DH	09:15	12:15	3	4	NW	0	0	2	2	0	0	7
18/01/2019	DH	09:30	12:30	1	2	NW	0	5	2	2	0	0	4
18/01/2019	DH	09:30	12:30	2	2	W	0	2	2	2	0	0	4
18/01/2019	DH	09:30	12:30	3	2	S	0	2	2	2	0	0	5
21/01/2019	AH	13:05	16:05	1	4	SW	0	8	2	2	0	0	3
21/01/2019	AH	13:05	16:05	2	4	SW	2	8	2	2	0	0	4
21/01/2019	AH	13:05	16:05	3	4	SW	2	8	2	2	0	0	4
15/02/2019	DH	09:30	12:30	1	3	S	0	8	2	2	0	0	10
15/02/2019	DH	09:30	12:30	2	2	S	0	8	2	2	0	0	11

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
15/02/2019	DH	09:30	12:30	3	5	S	0	6	2	2	0	0	11
17/02/2019	DH	14:05	17:05	1	5	S	0	7	2	2	0	0	11
17/02/2019	DH	14:05	17:05	2	6	S	0	6	2	2	0	0	9
17/02/2019	DH	14:05	17:05	3	5	S	0	2	2	2	0	0	9
12/03/2019	RB	13:50	16:50	1	5	W	0	6	2	2	0	0	6
12/03/2019	RB	13:50	16:50	2	6	W	0	5	2	2	0	0	6
12/03/2019	RB	13:50	16:50	3	5	W	2	8	2	2	0	0	6
15/03/2019	DH	14:00	17:00	1	4	NW	0	6	2	2	0	0	9
15/03/2019	DH	14:00	17:00	2	4	N	2	8	2	2	0	0	9
15/03/2019	DH	14:00	17:00	3	4	N	0	8	2	2	0	0	8

Table AII-2: Weather data collected during flight activity surveys undertaken at WFI VP2

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
25/10/2018	AH	09:20	12:20	1	1	SW	1	8	1	1	0	0	12
25/10/2018	AH	09:20	12:20	2	2	SW	1	8	2	2	0	0	12
25/10/2018	AH	09:20	12:20	3	2	SW	1	8	1	1	0	0	12
26/10/2018	DH	13:30	16:30	1	3	E	0	6	2	2	0	0	8
26/10/2018	DH	13:30	16:30	2	3	SE	1	5	2	2	0	0	8
26/10/2018	DH	13:30	16:30	3	3	SE	0	2	2	2	0	0	7
29/10/2018	DH	12:40	15:40	1	2	S	0	8	2	2	0	0	5
29/10/2018	DH	12:40	15:40	2	2	S	0	8	2	2	0	0	6
29/10/2018	DH	12:40	15:40	3	2	S	0	8	2	2	0	0	6
20/11/2018	DH	09:30	12:30	1	2	NW	0	4	2	2	0	0	6
20/11/2018	DH	09:30	12:30	2	2	NW	1	5	2	2	0	0	6
20/11/2018	DH	09:30	12:30	3	2	NW	0	8	2	2	0	0	7
06/12/2018	DH	09:30	12:30	1	2	E	1	8	1	0	0	0	10
06/12/2018	DH	09:30	12:30	2	2	E	0	8	2	1	0	0	11
06/12/2018	DH	09:30	12:30	3	2	E	0	8	2	1	0	0	11
09/12/2018	DH	12:35	15:35	1	5	NW	0	6	2	2	0	0	7
09/12/2018	DH	12:35	15:35	2	4	NW	0	3	2	2	0	0	7
09/12/2018	DH	12:35	15:35	3	4	NW	0	3	2	2	0	0	6
15/01/2019	RB	13:00	16:00	1	1	N	0	8	2	2	0	0	10
15/01/2019	RB	13:00	16:00	2	1	N	1	8	1	1	0	0	9
15/01/2019	RB	13:00	16:00	3	1	N	1	8	1	1	0	0	9
15/02/2019	RB	13:30	16:55	1	4	S	1	8	2	2	0	0	12
15/02/2019	RB	13:30	16:55	2	5	S	1	8	1	2	0	0	12
15/02/2019	RB	13:30	16:55	3	6	S	1	8	1	2	0	0	12
17/02/2019	RB	10:00	13:00	1	4	SW	0	1	2	2	0	0	9
17/02/2019	RB	10:00	13:00	2	4	SW	0	4	1	2	0	0	8

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
17/02/2019	RB	10:00	13:00	3	4	SW	0	5	1	2	0	0	8
12/03/2019	AH	09:45	12:45	1	2	S	1	7	1	2	0	0	5
12/03/2019	AH	09:45	12:45	2	2	S	0	4	1	2	0	0	5
12/03/2019	AH	09:45	12:45	3	4	S	1	8	1	2	0	0	6
16/03/2019	DH	11:15	14:15	1	4	S	0	8	1	1	0	0	8
16/03/2019	DH	11:15	14:15	2	4	S	0	8	1	1	0	0	8
16/03/2019	DH	11:15	14:15	3	4	S	0	8	1	1	0	0	8

Table AII-3: Weather data collected during flight activity surveys undertaken at WFII VP1

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
25/10/2018	AH	13:20	16:20	1	3	SW	1	8	2	2	0	0	13
25/10/2018	AH	13:20	16:20	2	2	SW	1	8	2	2	0	0	13
25/10/2018	AH	13:20	16:20	3	2	SW	0	8	2	2	0	0	13
28/10/2018	AH	08:50	11:50	1	0	N/A	0	0	N/A	2	0	1	4
28/10/2018	AH	08:50	11:50	2	1	NW	0	0	N/A	2	0	0	6
28/10/2018	AH	08:50	11:50	3	2	NW	0	0	N/A	2	0	0	7
22/11/2018	AH	09:30	12:30	1	3	E	0	1	2	2	0	0	6
22/11/2018	AH	09:30	12:30	2	3	E	0	2	2	2	0	0	6
22/11/2018	AH	09:30	12:30	3	3	E	0	3	2	2	0	0	6
22/11/2018	AH	12:40	15:40	1	3	E	0	4	2	2	0	0	6
22/11/2018	AH	12:40	15:40	2	2	E	0	3	2	2	0	0	5
22/11/2018	AH	12:40	15:40	3	2	E	0	3	2	2	0	0	5
23/11/2018	AH	13:00	16:00	1	3	NE	0	8	2	2	0	0	5
23/11/2018	AH	13:00	16:00	2	3	NE	0	8	2	2	0	0	5
23/11/2018	AH	13:00	16:00	3	3	NE	0	8	2	2	0	0	5
10/12/2018	DH	09:10	12:10	1	3	NW	0	7	2	2	0	0	10
10/12/2018	DH	09:10	12:10	2	3	NW	2	8	2	2	0	0	11
10/12/2018	DH	09:10	12:10	3	3	NW	2	8	2	2	0	0	11
16/01/2019	AH	13:55	16:55	1	1	W	1	8	2	2	0	0	7
16/01/2019	AH	13:55	16:55	2	1	W	0	8	2	2	0	0	7
16/01/2019	AH	13:55	16:55	3	1	W	1	7	2	2	0	0	7
13/02/2019	DH	12:50	15:50	1	5	SE	0	8	2	2	0	0	12
13/02/2019	DH	12:50	15:50	2	5	S	0	8	2	2	0	0	12
13/02/2019	DH	12:50	15:50	3	4	S	0	8	2	2	0	0	12
17/02/2019	RB	14:00	17:15	1	6	SW	0	7	1	2	0	0	9
17/02/2019	RB	14:00	17:15	2	6	SW	1	6	1	2	0	0	9

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
17/02/2019	RB	14:00	17:15	3	6	SW	0	6	1	2	0	0	8
12/03/2019	RB	13:40	16:40	1	5	S	0	3	2	2	0	0	8
12/03/2019	RB	13:40	16:40	2	6	S	0	8	1	1	0	0	5
12/03/2019	RB	13:40	16:40	3	7	S	1	8	1	1	0	0	5
16/03/2019	RB	07:45	11:00	1	4	S	3	8	0	1	0	0	10
16/03/2019	RB	07:45	11:00	2	4	S	2	8	0	1	0	0	11
16/03/2019	RB	07:45	11:00	3	4	S	1	8	0	1	0	0	11

Table AII-4: Weather data collected during flight activity surveys undertaken at WFII VP2

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
25/10/2018	DH	13:30	16:30	1	2	E	0	8	2	2	0	0	11
25/10/2018	DH	13:30	16:30	2	3	E	0	8	2	2	0	0	10
25/10/2018	DH	13:30	16:30	3	2	E	1	8	2	2	0	0	10
28/10/2018	DH	09:00	12:00	1	1	SE	0	0	N/A	2	0	1	2
28/10/2018	DH	09:00	12:00	2	1	SE	0	0	N/A	2	0	0	4
28/10/2018	DH	09:00	12:00	3	2	SE	0	0	N/A	2	0	0	7
22/11/2018	DH	09:30	12:30	1	3	SE	0	0	2	2	0	0	3
22/11/2018	DH	09:30	12:30	2	3	SE	0	0	2	2	0	0	3
22/11/2018	DH	09:30	12:30	3	2	SE	0	2	2	2	0	0	4
23/11/2018	DH	13:10	16:10	1	3	NE	0	8	2	2	0	0	4
23/11/2018	DH	13:10	16:10	2	3	NE	0	8	2	2	0	0	5
23/11/2018	DH	13:10	16:10	3	3	NE	0	8	2	2	0	0	5
07/12/2018	DH	09:15	12:15	1	4	NW	3	8	2	2	0	0	7
07/12/2018	DH	09:15	12:15	2	4	NW	1	6	2	2	0	0	8
07/12/2018	DH	09:15	12:15	3	5	NW	3	6	2	2	0	0	9
07/12/2018	DH	12:30	15:30	1	5	NW	3	8	2	2	0	0	8
07/12/2018	DH	12:30	15:30	2	5	NW	0	6	2	2	0	0	8
07/12/2018	DH	12:30	15:30	3	5	NW	0	4	2	2	0	0	7
10/12/2018	DH	12:30	15:30	1	4	NW	1	8	2	2	0	0	9
10/12/2018	DH	12:30	15:30	2	3	NW	0	8	2	2	0	0	8
10/12/2018	DH	12:30	15:30	3	3	NW	1	8	2	2	0	0	8
16/01/2019	DH	13:55	16:55	1	2	NW	3	8	2	2	0	0	4
16/01/2019	DH	13:55	16:55	2	2	NW	0	8	2	2	0	0	4
16/01/2019	DH	13:55	16:55	3	2	NW	2	4	2	2	0	0	3

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
19/01/2019	DH	12:50	15:50	1	1	S	0	8	2	2	0	0	8
19/01/2019	DH	12:50	15:50	2	1	S	0	8	2	2	0	0	7
19/01/2019	DH	12:50	15:50	3	1	S	0	8	2	2	0	0	5
13/02/2019	DH	09:15	12:15	1	5	S	0	8	2	2	0	0	11
13/02/2019	DH	09:15	12:15	2	5	S	0	8	2	2	0	0	12
13/02/2019	DH	09:15	12:15	3	5	S	0	8	2	2	0	0	12
18/02/2019	RB	09:45	12:45	1	3	SW	2	7	1	2	0	0	6
18/02/2019	RB	09:45	12:45	2	4	SW	0	5	1	2	0	0	
18/02/2019	RB	09:45	12:45	3	3	SW	0	5	2	2	0	0	

Table AII-5: Weather data collected during flight activity surveys undertaken at WFII VP3

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
26/10/2018	DH	09:40	12:40	1	4	E	0	5	2	2	0	0	4
26/10/2018	DH	09:40	12:40	2	4	E	0	3	2	2	0	0	5
26/10/2018	DH	09:40	12:40	3	4	E	0	2	2	2	0	0	5
29/10/2018	DH	09:20	12:20	1	1	N/A	0	8	2	2	0	0	4
29/10/2018	DH	09:20	12:20	2	1	N/A	0	8	2	2	0	0	5
29/10/2018	DH	09:20	12:20	3	1	N/A	0	8	2	2	0	0	6
20/11/2018	DH	13:00	16:00	1	4	NW	0	8	2	2	0	0	7
20/11/2018	DH	13:00	16:00	2	4	NW	0	8	2	2	0	0	7
20/11/2018	DH	13:00	16:00	3	4	NW	0	6	2	2	0	0	7
23/11/2018	DH	09:30	12:30	1	2	SE	0	0		2	0	1	1
23/11/2018	DH	09:30	12:30	2	2	SE	0	3	2	2	0	0	2
23/11/2018	DH	09:30	12:30	3	2	SE	0	6	2	2	0	0	4
16/01/2019	DH	09:15	12:15	1	0	SE	0	2	2	2	0	0	3
16/01/2019	DH	09:15	12:15	2	1	NS	2	6	2	2	0	0	9
16/01/2019	DH	09:15	12:15	3	1	NS	0	3	2	2	0	0	5
15/02/2019	DH	13:40	16:40	1	3	SW	0	8	2	2	0	0	14
15/02/2019	DH	13:40	16:40	2	2	SW	0	8	2	2	0	0	14
15/02/2019	DH	13:40	16:40	3	2	SW	0	8	2	2	0	0	12
18/02/2019	DH/RB	13:57	16:57	1	4	SW	0	6	2	2	0	0	9
18/02/2019	DH/RB	13:57	16:57	2	4	SW	0	3	2	2	0	0	9
18/02/2019	DH/RB	13:57	16:57	3	5	SW	0	5	2	2	0	0	7
12/03/2019	DH	09:55	12:55	1	4	SW	0	4	2	2	0	0	6
12/03/2019	DH	09:55	12:55	2	6	SW	2	7	2	2	0	0	6
12/03/2019	DH	09:55	12:55	3	5	SW	0	6	2	2	0	0	7

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
16/03/2019	DH	11:25	14:25	1	4	SW	0	8	2	2	0	0	10
16/03/2019	DH	11:25	14:25	2	4	SW	0	8	2	2	0	0	10
16/03/2019	DH	11:25	14:25	3	4	SW	1	8	2	2	0	0	11

Table AII-6: Weather data collected during flight activity surveys undertaken at WFII VP4

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
26/10/2018	AH	09:10	12:10	1	3	NW	0	1	2	2	0	0	5
26/10/2018	AH	09:10	12:10	2	3	NW	0	3	2	2	0	0	6
26/10/2018	AH	09:10	12:10	3	3	NW	0	4	2	2	0	0	6
29/10/2018	AH	13:00	16:00	1	2	SE	0	8	2	2	0	0	4
29/10/2018	AH	13:00	16:00	2	2	SE	0	8	2	2	0	0	4
29/10/2018	AH	13:00	16:00	3	2	SE	0	8	2	2	0	0	4
20/11/2018	AH	13:01	16:01	1	3	N	0	3	2	2	0	0	7
20/11/2018	AH	13:01	16:01	2	4	N	2	7	2	2	0	0	7
20/11/2018	AH	13:01	16:01	3	4	N	0	6	2	2	0	0	6
23/11/2018	AH	09:25	12:25	1	2	NE	0	2	2	2	0	1	1
23/11/2018	AH	09:25	12:25	2	2	NE	0	3	2	2	0	0	2
23/11/2018	AH	09:25	12:25	3	2	NE	0	6	2	2	0	0	4
16/01/2019	AH	09:10	12:10	1	2	W	0	3	2	2	0	0	6
16/01/2019	AH	09:10	12:10	2	1	W	0	3	2	2	0	0	7
16/01/2019	AH	09:10	12:10	3	1	W	0	4	2	2	0	0	7
18/01/2019	AH	12:55	15:55	1	2	W	0	7	2	2	0	0	8
18/01/2019	AH	12:55	15:55	2	2	W	0	7	2	2	0	0	8
18/01/2019	AH	12:55	15:55	3	2	W	0	7	2	2	0	0	8
19/01/2019	AH	09:12	12:12	1	0	W	0	8	1	0	0	0	6
19/01/2019	AH	09:12	12:12	2	0	S	0	8	1	1	0	0	7
19/01/2019	AH	09:12	12:12	3	0	S	0	8	1	2	0	0	8
17/02/2019	DH	10:07	13:07	1	3	SE	0	1	2	2	0	0	10
17/02/2019	DH	10:07	13:07	2	4	SE	0	5	2	2	0	0	11
17/02/2019	DH	10:07	13:07	3	4	SE	0	4	2	2	0	0	11

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
18/02/2019	DH	09:40	12:40	1	4	SE	3	8	2	2	0	0	
18/02/2019	DH	09:40	12:40	2	4	SE	0	5	2	2	0	0	
18/02/2019	DH	09:40	12:40	3	4	SE	0	6	2	2	0	0	
16/03/2019	DH	07:50	10:50	1	5	SW	3	8	2	2	0	0	6
16/03/2019	DH	07:50	10:50	2	5	SW	1	8	2	2	0	0	8
16/03/2019	DH	07:50	10:50	3	5	SW	0	8	2	2	0	0	8

Table AII-7: Key to weather data

Rain/ Precipitation		**Cloud Cover**	**Visibility**		**Lying Snow**		**Frost**	
None	0	Expressed in oktas (n/8)	Poor (<1km)	0	None	0	None	0
Drizzle	1	**Cloud Height**	Moderate (1-3km)	1	On site	1	Ground	1
Light showers/snow	2	Height of cloud above	Good (>3km)	2	On higher ground	2	All day	2
Heavy showers/snow	3	average height of viewshed						
Heavy rain/snow	4	<150m 0						
		150-500m 1						
		>500m 2						

APPENDIX III

Flight activity survey data

Primary Target Species

Table AIII-1a: Primary target species flight activity data from WFI VP1

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
25/10/2018	DH	1	WG	5	U	U	10:40	15	Y
29/10/2018	DH	25	SN	1	U	U	13:28	30	N
20/11/2018	AH	31	WS	3	A	U	09:48	60	Y
20/11/2018	AH	32	WG	14	A	U	11:33	75	Y
09/12/2018	DH	44	SH	2	U	U	10:43	60	Y
17/02/2019	DH	52	BZ	1	U	U	16:23	30	Y
17/02/2019	DH	53	SH	1	M	U	16:48	15	N

Table AIII-2a: Primary target species flight activity data from WFI VP2

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
25/10/2018	AH	2	GP	40	U	U	10:05	90	Y
25/10/2018	AH	3	SN	1	U	U	10:40	45	Y
25/10/2018	AH	4	SH	1	U	U	11:48	60	N
26/10/2018	DH	10	WS	18	U	U	15:52	45	Y
18/01/2019	AH	49	GP	52	U	AD	09:30	45	Y
15/02/2019	RB	50	Unidentified goose sp.	100	U	U	14:17	60	N

Table AIII-3a: Primary target species flight activity data from WFII VP1

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
25/10/2018	AH	5	PE	1	A	F	14:16	60	N
28/10/2018	AH	14	L.	26	U	U	09:26	75	N
28/10/2018	AH	15	L.	1	U	U	10:11	60	N
22/11/2018	AH	36	HH	1	U	A	12:01	45	N
16/01/2019	AH	46	PE	1	M	AD	15:55	30	N
12/03/2019	RB	59	T.	6	U	U	13:45	15	N

Table AIII-4a: Primary target species flight activity data from WFII VP2

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
28/10/2018	DH	11	WS	1	U	U	10:05	30	N
28/10/2018	DH	12	L.	8	U	U	10:28	75	N
28/10/2018	DH	13	WS	3	U	U	10:38	45	N
07/12/2018	DH	42	SH	1	M	AD	10:14	15	N

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
07/12/2018	DH	43	PE	1	F	AD	13:19	45	N
19/01/2019	DH	48	T.	14	U	U	14:38	60	N
18/02/2019	RB	54	SN	1	U	U	10:27	15	N
15/03/2019	RB	60	K.	1	M	AD	15:15	30	N
15/03/2019	RB	61	K.	1	M	AD	15:17	105	N

Table AIII-5a: Primary target species flight activity data from WFII VP3

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
26/10/2018	DH	6	CU	6	U	U	09:51	15	N
26/10/2018	DH	7	L.	4	U	U	10:00	45	N
26/10/2018	DH	8	CU	13	U	U	10:00	30	N
26/10/2018	DH	9	CU	5	U	U	10:51	30	N
29/10/2018	DH	16	L.	23	U	U	09:40	45	N
29/10/2018	DH	17	L.	23	U	U	09:46	60	N
29/10/2018	DH	18	CU	13	U	U	09:47	30	N
29/10/2018	DH	19	WS	1	U	U	10:43	30	N
29/10/2018	DH	20	GP	4	U	U	10:58	15	N
20/11/2018	DH	34	GP	7	U	U	14:38	30	N
20/11/2018	DH	35	L.	17	U	U	15:05	45	N
23/11/2018	DH	38	T	16	U	U	10:03	30	N
23/11/2018	DH	39	PE	1	F	U	10:08	15	N
23/11/2018	DH	40	CU	11	U	U	10:08	30	N
23/11/2018	DH	41	CU	1	U	U	10:22	45	N
16/01/2019	DH	47	MA	3	M	U	09:15	45	N
16/01/2019	DH	47	L	22	U	U	09:21	60	N
16/01/2019	DH	47	CU	15	U	U	09:47	30	N
16/01/2019	DH	47	WS	21	U	16 AD/5 J	09:52	15	N
16/01/2019	DH	47	WS	4	U	3 AD/ 1 J	09:52	75	Y
16/01/2019	DH	47	CU	16	U	U	09:53	90	Y
15/02/2019	DH	51	CU	34	U	U	14:38	30	N
18/02/2019	DH/RB	55	CU	38	U	U	13:58	90	N
18/02/2019	DH/RB	56	CU	36	U	U	14:00	30	N
18/02/2019	DH/RB	57	CU	1	U	U	14:49	15	N
18/02/2019	DH/RB	58	CU	14	U	U	15:03	45	Y
16/03/2019	DH	62	L.	1	U	U	11:35	30	N

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
16/03/2019	DH	63	MA	4	1M 3F	AD	12:38	45	N
16/03/2019	DH	64	WN	15	U	AD	13:13	30	N

Table AIII-6a: Primary target species flight activity data from WFII VP4

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Height Band 2 (Y/N)
29/10/2018	AH	26	CU	9	A	U	14:20	45	N
29/10/2018	AH	27	SN	3	A	U	14:34	45	Y
29/10/2018	AH	28	SN	2	A	U	14:36	60	Y
29/10/2018	AH	29	SN	1	A	U	14:49	45	N
29/10/2018	AH	30	L.	1	A	U	14:49	45	N
20/11/2018	AH	33	PE	1	A	F	13:57	180	N
23/11/2018	AH	37	L.	23	U	U	11:19	90	N
16/01/2019	AH	45	WS	2	U	AD	11:10	75	N

Secondary Target Species

Table AIII-1b: Secondary target species flight activity data from WFI VP1

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
25/10/2018	09:45	12:45	RN	1	10:20	N
29/10/2018	13:00	16:00	RN	1	13:05	Y
22/11/2018	13:00:00	16:00	BH	1	13:05	N
22/11/2018	13:00	16:00	BH	7	13:10	N
22/11/2018	13:00:00	16:00	RN	1	14:30	N
22/11/2018	13:00	16:00	RN	2	15:30	N
06/12/2018	12:50	15:50	RN	2	13:40	Y
06/12/2018	12:50	15:50	RN	2	14:10	N
06/12/2018	12:50	15:50	RN	6	14:55	N
09/12/2018	09:15	12:15	RN	2	09:50	Y
09/12/2018	09:15	12:15	RN	3	10:35	Y
09/12/2018	09:15	12:15	RN	1	10:40	N
18/01/2019	09:30	12:30	RN	1		Y
18/01/2019	09:30	12:30	RN	1		Y
18/01/2019	09:30	12:30	RN	1		N
18/01/2019	09:30	12:30	RN	1		Y
15/02/2019	09:30	12:30	RN	2	11:10	N
17/02/2019	14:05	17:05	RN	2	14:45	Y
17/02/2019	14:05	17:05	RN	1	16:10	N
12/03/2019	13:50	16:50	HG	3	14:30	N
12/03/2019	13:50	16:50	RN	2	14:55	N
12/03/2019	13:50	16:50	RN	2	15:10	N
15/03/2019	14:00	17:00	LB	2	15:40	Y

Table AIII-2b: Secondary target species flight activity data from WFI VP2

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
20/11/2018	09:30	12:30	RN	2	10:40	N
06/12/2018	09:30	12:30	BH	8	09:55	Y
06/12/2018	09:30	12:30	BH	3	10:00	N
06/12/2018	09:30	12:30	RN	2	10:40	Y
06/12/2018	09:30	12:30	RN	1	10:50	Y
06/12/2018	09:30	12:30	RN	2	11:25	N
09/12/2018	12:35	15:35	RN	1	13:50	N
09/12/2018	12:35	15:35	BH	4	14:45	N
15/01/2019	13:00	16:00	BH	1	13:55	Y
15/01/2019	13:00	16:00	RN	1	14:40	N
15/01/2019	13:00	16:00	RN	3	13:20	N
15/01/2019	13:00	16:00	RN	1	15:20	Y
15/02/2019	13:30	16:55	GB	1	15:14	N
12/03/2019	09:45	12:45	GB	3	10:53	Y
12/03/2019	09:45	12:45	GB	1	11:00	Y
12/03/2019	09:45	12:45	RN	6	11:15	Y

Table AIII-3b: Secondary target species flight activity data from WFII VP1

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
28/10/2018	08:50	11:50	RN	2	10:30	N
22/11/2018	09:30	12:30	RN	3	10:45	Y
22/11/2018	09:30	12:30	BH	10	11:40	N
22/11/2018	09:30	12:30	CM	2	11:40	N
10/12/2018	09:10	12:10	RN	1	09:40	N
10/12/2018	09:10	12:10	RN	2	10:15	Y
10/12/2018	09:10	12:10	BH	4	10:35	N
10/12/2018	09:10	12:10	RN	1	10:55	N
10/12/2018	09:10	12:10	RN	1	11:50	N

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
13/02/2019	12:50	15:50	RN	2	13:40	N
13/02/2019	12:50	15:50	RN	1	14:15	Y
12/03/2019	13:40	16:40	GB	1	16:14	Y

Table AIII-4b: Secondary target species flight activity data from WFII VP2

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
25/10/2018	13:30	16:30	RN	2	14:35	Y
25/10/2018	13:30	16:30	RN	1	14:40	N
25/10/2018	13:30	16:30	RN	1	15:05	N
28/10/2018	09:00	12:00	RN	1	09:35	N
28/10/2018	N09:00	12:00	RN	3	10:10	N
28/10/2018	09:00	12:00	RN	1	10:40	N
28/10/2018	09:00	12:00	RN	2	10:55	N
22/11/2018	09:30	12:30	RN	1	09:30	N
22/11/2018	09:30	12:30	RN	2	09:35	N
22/11/2018	09:30	12:30	RN	2	09:50	Y
22/11/2018	09:30	12:30	RN	4	09:50	N
22/11/2018	09:30	12:30	RN	2	10:20	Y
22/11/2018	09:30	12:30	RN	3	10:20	N
22/11/2018	09:30	12:30	RN	3	10:20	N
22/11/2018	09:30	12:30	RN	1	11:25	N
23/11/2018	13:10	16:10	RN	1	13:20	N
23/11/2018	13:10	16:10	RN	1	13:30	N
23/11/2018	13:10	16:10	RN	2	13:35	N
23/11/2018	13:10	16:10	RN	1	13:50	Y
23/11/2018	13:10	16:10	RN	4	14:00	N
23/11/2018	13:10	16:10	RN	1	14:10	N
23/11/2018	13:10	16:10	RN	1	14:25	Y

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
23/11/2018	13:10	16:10	RN	1	14:40	Y
23/11/2018	13:10	16:10	RN	2	15:10	N
23/11/2018	13:10	16:10	RN	2	15:15	N
23/11/2018	13:10	16:10	RN	2	15:35	Y
07/12/2018	09:15	12:15	RN	2	09:35	Y
07/12/2018	09:15	12:15	RN	1	09:55	Y
07/12/2018	09:15	12:15	BH	6	10:00	N
07/12/2018	09:15	12:15	BH	3	10:10	Y
07/12/2018	09:15	12:15	RN	3	10:30	Y
07/12/2018	09:15	12:15	RN	1	10:50	Y
07/12/2018	12:30	15:30	RN	2	13:15	N
07/12/2018	12:30	15:30	RN	1	13:35	Y
07/12/2018	12:30	15:30	BH	14	14:50	N
07/12/2018	12:30	15:30	RN	2	15:20	N
10/12/2018	12:30	15:30	RN	2	13:25	Y
10/12/2018	12:30	15:30	RN	1	14:15	N
19/01/2019	12:50	15:50	RN	1	12:55	Y
19/01/2019	12:50	15:50	RN	1	13:20	Y
19/01/2019	12:50	15:50	RN	2	13:35	Y
19/01/2019	12:50	15:50	RN	1	14:00	N
19/01/2019	12:50	15:50	RN	1	14:05	Y
19/01/2019	12:50	15:50	RN	2	14:20	Y
19/01/2019	12:50	15:50	RN	3	14:40	N
19/01/2019	12:50	15:50	RN	1	14:55	N
19/01/2019	12:50	15:50	RN	1	15:05	N
19/01/2019	12:50	15:50	RN	2	15:30	N
13/02/2019	09:15	12:15	RN	1	09:20	Y
13/02/2019	09:15	12:15	RN	2	09:45	N
13/02/2019	09:15	12:15	RN	1	09:55	N

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
13/02/2019	09:15	12:15	BH	2	10:30	Y
13/02/2019	09:15	12:15	BH	4	11:40	Y
18/02/2019	09:45	12:45	BH	12	11:14	N
18/02/2019	09:45	12:45	BH	25	12:03	N

Table AIII-5b: Secondary target species flight activity data from WFII VP3

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
26/10/2018	09:40	12:40	RN	1	10:30	N
29/10/2018	09:20	12:20	BH	6	09:40	N
29/10/2018	09:20	12:20	RN	4	10:10	N
20/11/2018	13:00	16:00	RN	1	14:20	N
23/11/2018	09:30	12:30	BH	13	09:45	N
23/11/2018	09:30	12:30	BH	2	10:15	N
23/11/2018	09:30	12:30	RN	2	10:45	Y
23/11/2018	09:30	12:30	BH	6	10:55	N
23/11/2018	09:30	12:30	BH	2	11:10	N
23/11/2018	09:30	12:30	RN	1	11:30	N
16/01/2019	09:15	12:15	BH	70-80	09:25	Y
16/01/2019	09:15	12:15	BH	1	09:40	Y
16/01/2019	09:15	12:15	BH	120-150	09:50	N
16/01/2019	09:15	12:15	BH	4	10:15	Y
16/01/2019	09:15	12:15	BH	2	11:00	Y
16/01/2019	09:15	12:15	BH	80	11:10	N
16/01/2019	09:15	12:15	BH	7	12:05	N
15/02/2019	13:40	16:40	BH	2	14:00	Y
15/02/2019	13:40	16:40	RN	2	14:05	Y
15/02/2019	13:40	16:40	RN	1	14:50	Y
15/02/2019	13:40	16:40	RN	1	16:10	Y
18/02/2019	13:57	16:57	BH	1	14:10	Y

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
18/02/2019	13:57	16:57	BH	20-25	14:45	Y
18/02/2019	13:57	16:57	RN	1	14:50	N
18/02/2019	13:57	16:57	BH	44	15:05	Y
18/02/2019	13:57	16:57	BH	4	15:40	N
18/02/2019	13:57	16:57	RN	1	15:40	Y
18/02/2019	13:57	16:57	HG	35	15:40	Y
18/02/2019	13:57	16:57	CG	6	15:35	N
12/03/2019	09:55	12:55	BH	2	10:40	N
12/03/2019	09:55	12:55	BH	14	10:55	N
12/03/2019	09:55	12:55	BH	1	11:15	N
12/03/2019	09:55	12:55	BH	4	11:25	N
12/03/2019	09:55	12:55	LB	1	11:40	N
12/03/2019	09:55	12:55	BH	2	12:10	N
16/03/2019	11:15	14:15	BH	5	11:20	N
16/03/2019	11:15	14:15	LB	2	12:35	N
16/03/2019	11:15	14:15	RN	8	12:40	N
16/03/2019	11:15	14:15	BH	11	13:15	N
16/03/2019	11:15	14:15	LB	3	13:45	N
16/03/2019	11:15	14:15	LB	1	14:05	N

Table AIII-6b: Secondary target species flight activity data from WFII VP4

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
20/11/2018	13:01	16:01	RN	3	13:00	Y
20/11/2018	13:01	16:01	RN	2	13:10	Y
20/11/2018	13:01	16:01	RN	5	13:10	Y
18/01/2019	12:55	15:55	RN	1	14:36	Y
18/01/2019	12:55	15:55	RN	2	14:51	Y
19/01/2019	09:12	12:12	RN	1	11:27	Y
17/02/2019	10:07	13:07	BH	70	11:15	Y

Date	Survey start	Survey end	Species	Count	5 min period	Height Band 2 (Y/N)
17/02/2019	10:07	13:07	BH	15	11:20	Y
17/02/2019	10:07	13:07	RN	2	12:30	Y
18/02/2019	09:40	12:40	RN	1	09:55	N
18/02/2019	09:40	12:40	BH	12	10:40	Y
18/02/2019	09:40	12:40	RN	1	10:50	N
18/02/2019	09:40	12:40	BH	1	11:30	N

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